

Appl. No. 09/976,927  
Arndt, dated May 23, 2003  
Reply to Office Action of February 26, 2002

PATENT

REMARKS/ARGUMENTS

This Amendment is responsive to the Office Action mailed on February 26, 2003. A Request For Continued Examination (RCE) is attached.

In this Amendment, pending claims 13-28 are canceled, and new claims 29-36 are added so that claims 29-36 are pending and subject to examination on the merits. Entry of this Amendment is respectfully requested.

On April 22, 2003, an interview between Examiner Kielen and the undersigned took place. The undersigned sincerely appreciates the Examiner's careful consideration of the arguments made by the undersigned.

The Examiner makes a number of rejections in the Office Action. Each of the rejections will be addressed in the order presented in the Office Action.

Schnur et al.

Claims 12, 13, 15, 18, 19, 21, 24-26, and 28 were previously rejected as anticipated by Schnur et al. (U.S. Patent No. 5,079,600). Schnur et al. describes a process for producing metal plated paths on a solid substrate, while using a self-assembling film that is chemically absorbed on the substrate's surface. A catalytic precursor which adheres only to those regions of the film and has enough reactivity to bind the catalyst is applied to the film's surface. The catalyst coated structure is then immersed in an electroless plating bath where metal plates onto the regions activated by the catalyst. See abstract.

Schnur et al. fails to anticipate each and every limitation of independent claim 29. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Schnur et al. does not anticipate independent claim 29, because Schnur et al. fails to teach a semiconductor device comprising, *inter alia*, "a diffusion barrier layer, wherein the diffusion barrier comprises a self-assembled monolayer, wherein the self-assembled monolayer is a single layer of molecules,

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and wherein the molecules in the self-assembled monolayer have first ends attached to the substrate and second ends projecting upward from the substrate; and (c) a metal layer comprising copper on the diffusion barrier layer, wherein the copper in the metal layer is in direct contact with the second ends of the molecules in the self-assembled monolayer" (emphasis added.) as recited in independent claim 29.

Although the Examiner notes at page 6 of the Office Action that Example 24 in Schnur et al. mentions "copper", Example 24 eventually refers to Example 9, which states that a colloidal Pd/Sn catalyst is applied to the ends of dichlorosilane molecules, and that copper is deposited on the catalyst. As shown on the cover page of the Schnur et al. patent, a "catalyst" is between "metal" and the terminal groups of silane molecules which are attached to the surface of a solid substrate (c. 10, lines 48-65). The catalyst is a palladium-tin colloid, that can cause electroless metal deposition in areas of a substrate to which the catalytic precursor has been attached (c. 7, l. 60-65). In Schnur et al., any copper that is deposited is not in direct contact with the terminal ends of the molecules that form Schnur et al.'s self-assembled film. Accordingly, Schnur et al. does not anticipate independent claim 29 (and any claims dependent thereon).

It would not have been obvious to modify Schnur et al. to remove the palladium-tin catalyst. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so. If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984). Here, an "object" of Schnur et al.'s invention is to produce "printed circuits utilizing relatively non-hazardous aqueous electroless plating solutions" (c. 6, l. 7-12). In order for the electroless plating process to work, the Pd/Sn catalyst described by Schnur et al. must be between any electrolessly plated metal (e.g., copper) and the terminal ends of Schnur et al.'s self-assembled monolayer. As is well known in the art of electroless plating, Pd/Sn acts as a seed material, and this seed material is necessary to start an electroless plating process (see, for example, c. 1, l. 24-47 of Calvert et al., U.S. Patent No. 5,389,496). There is no motivation to remove Schnur et al.'s

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Pd/Sn catalyst and substitute it with, for example, copper, or else Schnur et al.'s electroless plating process would not work as intended by Schnur et al.

Calvert et al.

Claims 12, 13, 15, 17, 18, 19, 21, 23, 24-26, and 28 are rejected as being anticipated by Calvert et al. (U.S. Patent No. 5,289,496). Schnur et al. and Simon et al. are also cited in this anticipation rejection. The invention described in Calvert et al. is also directed to an electroless metallization process (see c. 1., l. 17). One or more "chemical groups" that are capable of binding to an electroless catalyst are on a substrate (c. 4, l. 9-12). Instead of the Pd/Sn catalyst that is used in Schnur et al., Calvert et al. uses a tin-free catalyst with palladium (II) compounds (c. 4, l. 39-42). Metals such as cobalt, nickel, copper, gold, palladium, and various alloys may be electrolessly plated on the catalyst (c. 4, l. 49-62).

Calvert et al. also fails to anticipate the pending claims, because each and every element of the claims is not disclosed in Calvert et al. For example, Calvert et al. fails to teach or suggest a semiconductor device comprising, *inter alia*, "a diffusion barrier layer, wherein the diffusion barrier layer comprises a self-assembled monolayer, wherein the self-assembled monolayer is a single layer of molecules, and wherein the molecules in the self-assembled monolayer have first ends attached to the substrate and second ends projecting upward from the substrate; and (c) a metal layer comprising copper on the diffusion barrier layer, wherein the copper in the metal layer is in direct contact with the second ends of the molecules in the self-assembled monolayer" (emphasis added.) as recited in independent claim 29.

Even assuming *arguendo* that the "chemical groups" in Calvert et al. are molecules in a self-assembled monolayer, there is no teaching (or suggestion) in Calvert et al. of copper being in "direct contact" with the chemical groups. Calvert et al. teaches palladium compounds as catalysts for depositing metals. These catalytic palladium compounds would be between any deposited metals and the "chemical groups". Therefore, any electrolessly deposited metal would not be in "direct contact" with the ends of the chemical groups. Accordingly, Calvert et al. does not anticipate independent claim 29.

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Calvert et al. also does not render claim 29 obvious. There is no motivation to remove Calvert et al.'s palladium compound catalyst. As noted above, a catalyst such as Calvert et al.'s palladium compound catalyst is *required* for electroless plating. Since modifying Calvert et al.'s invention to remove the palladium compound catalyst would render Calvert et al.'s invention inoperative for its intended purpose, there is no motivation to modify Calvert et al. to arrive at the invention defined by independent claim 29.

Schnur et al. or Calvert et al., in further view of Wolf et al.

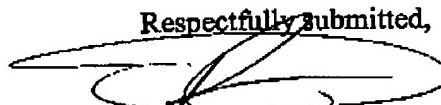
Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over either Schnur et al. or Calvert et al., in further view of Wolf et al.

Applicants submit that independent claim 29 is not obvious in view of Schnur et al. or Calvert et al. for the reasons provided above. The additional citation of Wolf et al. fails to cure the deficiencies of Schnur et al. and Calvert et al.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

  
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